

Application No. 10/707,308
Docket No. 138007
Amendment dated May 4, 2005
Reply to Office Action of February 4, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): A monolithic rotor formed by machining a rotor forging, the monolithic rotor comprising first and second rotor regions axially aligned within the monolithic rotor and a transition zone therebetween, the first and second rotor regions being formed of different alloys and the transition zone having a composition that differs from and varies between the first and second rotor regions, the first rotor region being located within a high pressure region of the monolithic rotor and formed from an alloy chosen from the group consisting of CrMoV low alloy steels, martensitic stainless steels containing about 11 to about 14 weight percent chromium, Fe-Ni alloys, and nickel-base alloys, and the second rotor region being located within a low pressure region of the monolithic rotor and formed from an alloy chosen from the group consisting of NiCrMoV low alloy steels and martensitic stainless steels containing about 11 to about 14 weight percent chromium, wherein the first rotor region is limited to being formed of a martensitic stainless

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steel, a Fe-Ni alloy, or a nickel-base alloy if the second rotor region is formed of a NiCrMoV low alloy steel.

Claim 2 (original): The monolithic rotor according to claim 1, wherein the first rotor region has a higher creep rupture strength than the second rotor region and the second rotor region has higher toughness than the first rotor region.

Claim 3 (original): The monolithic rotor according to claim 1, wherein the composition of the second rotor region is a NiCrMoV low alloy steel consisting of, by weight, about 2 to about 4% nickel, about 1 to about 2% chromium, about 0.2 to about 0.5% molybdenum, about 0.05 to about 0.2% vanadium, about 0.18 to about 0.35% carbon, the balance iron and incidental impurities.

Claim 4 (canceled)

Claim 5 (original): The monolithic rotor according to claim 3, wherein the composition of the first rotor region is a chromium-containing martensitic stainless steel consisting of, by weight, up to about 1.3% nickel, about 9 to

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about 14% chromium, about 0.1 to about 1% manganese, about 0.2 to about 2% molybdenum, about 0.1 to about 0.7% vanadium, up to about 3% tungsten, up to about 6% cobalt, about 0.03 to about 0.2% carbon, the balance iron and incidental impurities.

Claim 6 (original): The monolithic rotor according to claim 3, wherein the composition of the first rotor region is a Fe-Ni alloy consisting of, by weight, about 24 to about 27% nickel, about 13 to about 16% chromium, less than 2% manganese, about 1 to about 1.5% molybdenum, about 0.1 to about 0.5% vanadium, about 1.8 to about 2.5% titanium, less than 1% silicon, less than 0.5% aluminum, less than 0.08% carbon, the balance iron and incidental impurities.

Claim 7 (original): The monolithic rotor according to claim 3, wherein the composition of the first rotor region is a nickel-base alloy consisting of, by weight, about 16 to about 20% iron, about 17 to about 21% chromium, about 2.5 to about 3.5% molybdenum, about 4.5 to about 5.5% niobium, less than 0.35% manganese, about 0.6 to about 1.2% titanium, about 0.2 to about 0.8% aluminum, up to about 1% cobalt, less than 0.08% carbon, less than 0.35% silicon, the balance nickel and incidental impurities.

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Claim 8 (original): The monolithic rotor according to claim 1, wherein the composition of the second rotor region is a chromium-containing martensitic stainless steel alloy consisting of, by weight, about 11 to about 14% chromium, about 0.2 to about 1.2% manganese, about 1 to about 2.5% molybdenum, about 2 to about 3.5% nickel, about 0.2 to about 0.5% vanadium, about 0.05 to about 0.2% carbon, the balance iron and incidental impurities.

Claim 9 (original): The monolithic rotor according to claim 8, wherein the composition of the first rotor region is a CrMoV low alloy steel consisting of, by weight, about 0.25 to about 0.75% nickel, about 0.8 to about 2.5% chromium, about 0.5 to about 1% manganese, about 1 to about 2.5% molybdenum, about 0.2 to about 0.35% vanadium, about 0.15 to about 0.35% carbon, the balance iron and incidental impurities.

Claim 10 (original): The monolithic rotor according to claim 8, wherein the composition of the first rotor region is a chromium-containing martensitic stainless steel consisting of, by weight, up to about 1.3% nickel, about 9 to about 14% chromium, about 0.1 to about 1% manganese, about 0.2 to about 2% molybdenum, about 0.1 to about 0.7% vanadium, up to about 3% tungsten, up to about 6% cobalt, about 0.03 to about 0.2% carbon, the balance

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iron and incidental impurities.

Claim 11 (original): The monolithic rotor according to claim 8, wherein the composition of the first rotor region is a Fe-Ni alloy consisting of, by weight, about 24 to about 27% nickel, about 13 to about 16% chromium, less than 2% manganese, about 1 to about 1.5% molybdenum, about 0.1 to about 0.5% vanadium, about 1.8 to about 2.5% titanium, less than 1% silicon, less than 0.5% aluminum, less than 0.08% carbon, the balance iron and incidental impurities.

Claim 12 (original): The monolithic rotor according to claim 8, wherein the composition of the first rotor region is a nickel-base alloy consisting of, by weight, about 16 to about 20% iron, about 17 to about 21% chromium, about 2.5 to about 3.5% molybdenum, about 4.5 to about 5.5% niobium, less than 0.35% manganese, about 0.6 to about 1.2% titanium, about 0.2 to about 0.8% aluminum, up to about 1% cobalt, less than 0.08% carbon, less than 0.35% silicon, the balance nickel and incidental impurities.

Claim 13 (original): The monolithic rotor according to claim 1, wherein the rotor is a steam turbine rotor.

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Claim 14 (original): A steam turbine in which the monolithic rotor according to claim 13 is installed.

Claim 15 (original): The monolithic rotor according to claim 1, wherein the rotor is a gas turbine engine rotor.

Claim 16 (original): A gas turbine engine in which the monolithic rotor according to claim 15 is installed.

Claim 17 (original): The monolithic rotor according to claim 1, wherein the rotor is a jet engine rotor.

Claim 18 (original): A jet engine in which the monolithic rotor according to claim 17 is installed.

Claim 19 (new): A monolithic rotor formed by machining a rotor forging, the monolithic rotor comprising first and second rotor regions axially aligned within the monolithic rotor and a transition zone therebetween, the first and second rotor regions being formed of different alloys and the transition zone having a composition that differs from and varies between the first and

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second rotor regions, the first rotor region being located within a high pressure region of the monolithic rotor and formed from an alloy chosen from the group consisting of martensitic stainless steels containing about 11 to about 14 weight percent chromium, Fe-Ni alloys, and nickel-base alloys, and the second rotor region being located within a low pressure region of the monolithic rotor and formed from a NiCrMoV low alloy steel.

Claim 20 (new): A monolithic rotor formed by machining a rotor forging, the monolithic rotor comprising first and second rotor regions axially aligned within the monolithic rotor and a transition zone therebetween, the first and second rotor regions being formed of different alloys and the transition zone having a composition that differs from and varies between the first and second rotor regions, the first rotor region being located within a high pressure region of the monolithic rotor and formed from an alloy chosen from the group consisting of CrMoV low alloy steels, martensitic stainless steels containing about 11 to about 14 weight percent chromium, Fe-Ni alloys, and nickel-base alloys, and the second rotor region being located within a low pressure region of the monolithic rotor and formed from a martensitic stainless steel containing about 11 to about 14 weight percent chromium.